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Asian-Australian Monsoon Panel Report to the CLIVAR Scientific Steering Group-18

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Report to CLIVAR SSG-18

Panel or Working Group: Asian-Australian Monsoon Panel (AAMP)

1. Contributions to developing CLIVAR science and fit, where appropriate, to the CLIVAR imperatives

An important goal of the Asian-Australian Monsoon Panel is to promote the systematic evaluation of climate models (e.g., CMIP3, CMIP5) to (1) ascertain the fidelity with which the mean monsoon and its' variability is represented, (2) understand sources of model bias that affect the simulation of the monsoon, and (3) investigate the robustness of the impact of climate change on the monsoon. In anticipation of the CMIP5/AR5, the AAMP-10 prepared a preliminary list of diagnostics and metrics for evaluation of the Asian-Australian monsoon and its' variability. The metrics and diagnostics spanned diurnal through interdecadal time scales, with emphasis on selecting verifiable, objective, quantitative measures that are useful for tracking model development and model differences. This effort has now been expanded and formalized into a Monsoon Metrics Team, which includes In-sik Kang, Akio Kitoh, Ken Sperber, Andy Turner, Bin Wang, and Tianjun Zhou, with contributions from monsoon experts H. Annamalai and A. Moise. The task team met in conjunction with "The 3rd International Workshop on Global Change Projection: Modeling, Intercomparison, and Impact Assessment" that was held in Tsukuba, Japan in March 2011. Although the Sendai earthquake interrupted the meeting, the team met at the AAMP-11 and now has prepared outlines of proposed papers in which the metrics will be applied to the CMIP3 models and to the CMIP5 models when they become available. The initial emphasis will be devoted to model-model-observation evaluations of (1) boreal summer Asian monsoon, (2) Austral summer monsoon, and (3) ENSO-monsoon interactions. The Metrics team will continue to "meet" virtually and engage other interested parties who want to evaluate the CMIP5 models' depiction of the monsoon.

2. Cooperation with other WCRP projects, outside bodies (e.g IGBP) and links to applications

- a) AAMP interactions with the World Weather Research Program Year of Tropical Convection MJO Task Force (MJOTF) and GEWEX. Regarding the Monsoon ISV Prediction Experiment, AAMP and the MJOTF are working to develop systematic verification methods that are applicable to forecasts and hindcasts of the MJO. They should be useful for evaluation of single and multi-model skill. Additionally, AAMP promoted the interaction of the MJOTF with the GEWEX GCSS to facilitate a better understanding of (1) MJO processes and (2) the reasons for poor MJO simulation in models. A joint YOTC/GCSS/AAMP proposal for a MJO Diabatic Heating experiment is now being prepared.
- b) AAMP is continuing to support the CINDY2011/DYNAMO observational campaign through the procurement of high-resolution forecasts and analyses from available forecast centers. AAMP and YOTC are also promoting coordinated numerical experimentation for CINDY-DYNAMO, making use of the full range of modeling abilities (AGCMs, OGCMs, CGCMs, tropical channel, coupled regional mesoscale, regional, cloud resolving, SCM, ocean mixed layer models).

- c) CORDEX Interaction: At AAMP-10 the panel attempted to engage CORDEX regarding regional modeling over the Asian-Australian domain. Two invitations to attend AAMP-10 were turned down, though a presentation was supplied. In-person representation from CORDEX at CLIVAR panel meetings is essential to develop a plan of interaction. AAMP recommended that AMY observations be used in the assimilation cycle in the case where regional models are being used to provide reanalysis over East Asia. These observations also provide the opportunity for model validation and for predictability experiments that test the importance of using initialized land surface conditions. It was recommended that the regional reanalysis be extended to cover the CINDY/DYNAMO period. It was also recommended that CORDEX participate in the Regional Climate Outlook Fora, since the RCOF's are interested in downscaling their seasonal forecasts.
- d) AAMP participated in 7th session of the Forum on Regional Climate Monitoring, Assessment and Prediction for Asia (FOCRAII), held in Beijing, April 2011. AAMP emphasized that more rigor needs to be brought to this seasonal forecast outlook forum, especially with respect to forecast verification and the assessment of skill. This may be achieved through training, observing "best practices" for seasonal forecasting (Kirtman and Pirani, 2009, BAMS, DOI:10.1175/2008BAMS2707.1), and interaction with the International Research Institute (IRI) who has extensive experience with ensemble seasonal forecasting. Dr. K. Takano and AAMP are working to elucidate on the best approach for future progress, which may also include interaction with WGSIP.

3. Workshops/meetings held

- a) The CLIVAR AAMP and the YOTC MJO Task Force held a Modeling Workshop with a focus on modeling and predicting monsoon intraseasonal variability (MISV) and the MJO, 15-18 June 2010, at APEC Climate Center, Busan, Republic of Korea. There were 66 attendees, including 15 graduate students and early career researchers whose attendance was supported by travel grants from the U.S. National Science Foundation (NSF), the World Weather Research Program/The Observing System Research and Predictability Experiment (WWRP/THORPEX), and the WCRP. This cross-cutting activity provided an up-to-date assessment of the current capability to predict and simulate MISV and, particularly, the MJO; insight into the problems and issues that need to be addressed to move forward the capability to simulate and predict the MJO/MISV; an assessment and promotion of process-oriented diagnostics/metrics that target underlying physical mechanisms of the MJO/MISV to facilitate improvements in model parameterizations; a prioritized assessment of future research needs and directions to improve simulation and prediction capability of the MJO and MISV. A summary of the workshop is in press in BAMS:
<http://www.clivar.org/organization/aamp/publications/Modeling%20Monsoon%20IV.pdf>.
- b) The 10th Session of the CLIVAR's Asian-Australian Monsoon Panel (AAMP-10) was held at the APEC (Asia-Pacific Economic Cooperation) Climate Center, Busan, Republic of Korea from 15-19 June 2010. AAMP10 was held jointly with the First meeting of the YOTC Task Force on the Madden Julian Oscillation and the AAMP/MJOTF Workshop on Modelling Monsoon Intraseasonal Variability.
<http://www.clivar.org/organization/aamp/Meetings/10thmeeting.php>

- c) An AAMP member attended the 2nd PAGES Global Monsoon Symposium, held in Shanghai, China, September 2010. The symposium included an in-depth discussion on the concept of Global Monsoon and its response to external forcing and variability arising from internal feedback processes in the Earth climate. The foci of interest to AAMP included:
- Global monsoon concept
 - Global correlation of regional monsoons
 - Evidence of global monsoon intensity
 - Extreme hydrological events
- d) AAMP members attended the CLIVAR Workshop: New strategies for evaluating ENSO processes in climate models that was held in Paris, France, November 2010. AAMP members contributed to the survey of existing methods of evaluating ENSO processes in CGCMs, the identification of methods for bridging ENSO theory and CGCM modeling, the review the observing system and reanalysis data available for evaluating ENSO in CGCMs, and the recommendations for CMIP5 analysis. The discussion helped set the priorities for the ENSO-monsoon evaluation that AAMP is planning (see items 1 and 4a).
- e) The AAMP Monsoon Diagnostic Task Team met in conjunction with "The 3rd International Workshop on Global Change Projection: Modeling, Intercomparison, and Impact Assessment" in Tsukuba, Japan, March 2011. Some of the diagnostics and metrics were presented at this workshop, with the task team assessing their utility and refining their scope. Implementation of the diagnostics and metrics into an analysis package has been discussed, with the aim of making a systematic evaluation of the Coupled Model Intercomparison Project (CMIP) 5 simulations that will be analyzed for the IPCC AR5 Report.
- f) AAMP participated in the 7th session of the Forum on Regional Climate Monitoring, Assessment and Prediction for Asia (FOCRAII), 6-8 April 2011 at the National Climate Center (NCC) of China Meteorological Administration (CMA) Beijing, China. Eight AAMP panel members made science presentations at FOCRAII on modeling and predicting monsoon intraseasonal variability, the MJO, and decadal and interdecadal monsoon variability.
- g) In April 2011 the 11th Session of the CLIVAR's Asian-Australian Monsoon Panel (AAMP-11) was held at the National Climate Center of the China Meteorological Administration Beijing, China (immediately after the 7th session of FOCRAII). Specific objectives and key agenda items of the meeting were: 1) Review the status of the actions and recommendations approved at the previous sessions, 2) Update issues of importance to the panel, 3) Assess the results of the Monsoon FOCRAII session and propose actions to involve AAMP on related numerical experiments and predictions, 4) Assess the interaction of AAMP with other CLIVAR/WCRP panels and WGs, other field programs in the region, and 5) its contribution to the cross-cutting themes and other WCRP programs and activities.
- h) YOTC International Science Symposium and 8th AMY International Workshop to be held 16-19 May 2011 in Beijing China. AAMP supported the development of this workshop, and will have members participating in program. Of particular relevance to AAMP are the sessions on MJO and convectively coupled equatorial waves, Monsoon intraseasonal variability, extremes, and AMY, and

Seamless prediction and hierarchical modelling.

4. New activities being planned, including timeline,

- a) The CLIVAR Asian-Australian Monsoon Panel seeks to promote/implement during 2011/2012 the:
 - Development of standard diagnostics and metrics for monsoon evaluation/validation in CMIP5 and other numerical experiments, including presentations for the CLIVAR OSC, and the preparation of papers that use these diagnostics for evaluation of the Indian, East Asian and Australian monsoons.
 - Analysis of MJO/MISO hindcast experiments
 - Assessment of MJO real-time forecast skill (in conjunction with YOTC MJOTF)
 - Promote a better understanding to the role that land surface processes play in monsoon variability
- b) The CLIVAR Asian-Australian Monsoon Panel and the YOTC MJO Task Force seek to promote/implement during 2011/2012 the:
 - Development of process oriented diagnostics for improved understanding of MJO/MISO processes
 - Ongoing evaluation of real-time MJO forecasts, including impacts (tropical cyclones and higher latitude effects)
 - Development of diagnostics and metrics for boreal summer MISO, including forecast approaches that best capture the northward propagating component of the MISO
 - In combination with GEWEX GCSS, AAMP and the MJOTF are developing a joint proposal for a MJO Diabatic Heating experiment.
- c) The CLIVAR Asian-Australian Monsoon Panel and AMY propose a coordinated analysis of future change of AAM using AR5 outputs during 2012/2013.

5. Workshops/meetings planned (see ANNEX B also)

- a) 8th AMY International Workshop in conjunction with YOTC International Science Symposium: B. Wang will lead the session on Modeling and prediction.
- b) The YOTC International Science Symposium and the 8th AMY Workshop will jointly explore scientific overlap between weather and climate (seamless prediction) in the context of intraseasonal tropical variability and convection-wave interaction; variability and predictability of the monsoon system; tropical-extratropical interaction; easterly waves and tropical cyclones; and the diurnal cycle. In addition to the common themes with YOTC, the specific goal of the 8th AMY workshop is (a) to review the progress and achievement of each individual project and the AMY as a whole. The time period of the progress evaluation is (but not limited to) the period from July 2009 to present, (2) to coordinate further interaction, and (3) to prepare for the CLIVAR Open Science Conference in October 2011.
- c) AAMP is also promoting a workshop on Monsoon Decadal Variability in conjunction with WGSIP and other interested groups (see ANNEX B for proposal).

6. Issues for the SSG

Annex B

Proforma for CLIVAR Panel and Working Group requests for SSG approval for meetings

Requests should be made through D/ICPO (Robert.Molinari@noc.soton.ac.uk) against the following headings:

Panel or Working Group: CLIVAR Asian-Australian Monsoon Panel

Title of meeting or workshop: International workshop in interdecadal variability of the Asian-Australian monsoon

Proposed venue / Proposed dates: Possible venues and times for the workshop are being explored but possibilities include February to May 2012 at University of Hawaii or Queensland in association with the ACRE project.

Proposed attendees, including likely number: a variety from CLIVAR AAMP, CLIVAR IOP, CLIVAR PP, WGSIP, WGCM, relevant IGBP PAGES and ACRE community, encompassing senior experts and early career postdocs or exceptional students. In order to foster collaborative discussion and a workshop environment, the number of attendees will be around 50.

Rationale, motivation and justification, including: relevance to CLIVAR themes & JSC cross cutting topics and any cross-panel/working group links and interactions involved: Much of the recent focus on decadal variability has been based on the North Atlantic and teleconnections of Pacific decadal variability into the northern hemisphere extratropics. However, the Indian Ocean/Asian-Australian monsoon exhibits important decadal variations with potential large social and economic impacts. Nonetheless, little consensus exists on the characteristics of interdecadal variability in the Indian Ocean/Asian-Australian monsoon region despite many recent publications on this issue. Recent studies have highlighted three key points of interest. Firstly, there is strong interdecadal variability in the various regional monsoons themselves. For example, interdecadal variations of all-India rainfall have been observed (Fig. 1), as well as interdecadal variations of the East Asian summer monsoon that are consistent with changes in global monsoon rainfall (Fig. 2). Secondly, features embedded within the monsoon, such as tropical cyclones and monsoon depressions, also exhibit pronounced interdecadal variations (Fig. 3). Thirdly, there is a significant interdecadal modulation in the strength of the monsoon-ENSO teleconnection (Figs. 4 and 5) that impacts the prospect for seasonal prediction of the monsoon.

This workshop is expected to provide an overview of the current knowledge and issues on the interdecadal variability of the Asian-Australian monsoon systems and to promote coordinated experimental designs to test possible causes for interdecadal change in various models and explore predictability of the interdecadal changes.

There is excellent potential for cross-panel links and interactions, as outlined in the proposed attendees section above.

Specific objectives and key agenda items: The major objectives of the proposed workshop are (a) to review the present observational evidences of the aforementioned aspects of monsoon interdecadal variability collectively and on a regional monsoon basis; (b) to discuss how these variations are linked to other major modes of interdecadal variability such as PDO, IPO, or AMO and to climate change; (c) to

examine possible mechanisms underlying these interdecadal variations, including simulation and numerical experiments that address the physical processes that drive these interdecadal changes with the ultimate goal of assessing the predictability of monsoon interdecadal variations.

Anticipated outcomes (deliverables):

- Enhanced understanding of monsoon decadal variability: workshop summary to be prepared and submitted to (e.g.) BAMS
- Proposals of coordinated multi-model experiment designs to test mechanisms for drivers of decadal variability in the Asian-Australian monsoon, and of modulations of monsoon-ENSO teleconnections

Format: The workshop format will be a combination of invited presentations, and submitted oral and poster sessions as well as an open discussion. The CLIVAR AAMP ran a very successful workshop in a similar format on monsoon intraseasonal variability in Busan, Korea, in June 2010.

Science Organising Committee (if relevant): CLIVAR AAMP

Local Organising Committee (if relevant): to be determined depending on finalisation of host/location of meeting.

Proposed funding sources and anticipated funding requested from WCRP:
US CLIVAR, NSF, and an estimated amount of USD15K from WCRP

Annex B

Proforma for CLIVAR Panel and Working Group requests for SSG approval for meetings

Requests should be made through D/ICPO (Robert.Molinari@noc.soton.ac.uk) against the following headings:

Panel or Working Group: CLIVAR Asian-Australian Monsoon Panel

Title of meeting or workshop: 12th Session of the AAMP immediately after the International workshop in interdecadal variability of the Asian-Australian monsoon

Proposed venue / Proposed dates: Possible venues and times for the panel meeting are being explored but possibilities include a two-day meeting in February to May 2012 at University of Hawaii or Queensland in association with the ACRE project.

Proposed attendees, including likely number: AAMP panel members and invited experts, representatives from various forecast and invited experts participating in International workshop in interdecadal variability. Panel members would be ~10-12 people, and special guest around 6-8.

Rationale, motivation and justification, including: relevance to CLIVAR themes & JSC cross cutting topics and any cross-panel/working group links and interactions involved:

The 11th Session of the AMMP (AAMP11) was held in April 2011. AAMP11 was held immediately after the 7th session of FOCRAII meeting. The panel realizes that decadal variability of monsoon is a very important topic and we know little about its cause (maybe just beginning to understand). Therefore we are proposing to have the AAMP panel meeting after International workshop in interdecadal variability of the Asian-Australian monsoon at the same venue.

Specific objectives and key agenda items: Specific objectives and key agenda items of the meeting will be: 1) Review the status of the actions and recommendations approved at the previous sessions. 2) Update issues of importance to the panel. 3) Assess the results of the Interdecadal Variability Workshop and propose actions accordingly. 4) Assess the interaction of AAMP with other CLIVAR/WCRP panels and WGs, other field program developments for the region, and its contribution to the cross-cutting themes and other WCRP programs and activities.

Anticipated outcomes (deliverables):

The panel expects to assess the progress of the ongoing AAMP activities, in particular the new efforts for decadal/millennium monsoon variability that will make strong contribution to AR5.

Format: targeted presentations and discussion sessions.

Science Organising Committee (if relevant): AAMP co-chairs and ICPO representative.

Local Organising Committee (if relevant): to be determined depending on finalisation of host/location of meeting.

Proposed funding sources and anticipated funding requested from WCRP:

US CLIVAR, NSF, and an estimated amount of USD10K from WCRP